

1 **CLAIMS:**

2 1. A method for concealing data within a digital signal, the method  
3 comprising:

4 receiving a first data pattern of discrete values and a second data pattern of  
5 discrete values;

6 imposing a discrete value of the second data pattern over one or more  
7 values of the first data pattern.

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9 2. A method as recited in claim 1 further comprising encoding a third  
10 data pattern into the digital signal, wherein such third data pattern is the result of  
11 the imposing.

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13 3. A method as recited in claim 1, wherein the imposing comprises  
14 performing a Boolean operation with a discrete value of the second data pattern  
15 and one or more values of the first data pattern.

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17 4. A method as recited in claim 1, wherein the imposing comprises  
18 XORing a discrete value of the second data pattern with one or more values of the  
19 first data pattern.  
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1           5.    A method as recited in claim 1, wherein  
2           a pattern of discrete values may be encoded into the <sup>digital</sup>signal in one of  
3 multiple discrete states;

4           the imposing comprises encoding one or more values of the first data  
5 pattern into the digital signal into a state that indicates a discrete value of the  
6 second data pattern.

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8           6.    A method as recited in claim 1, wherein the digital signal is an digital  
9 audio signal.

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11           7.   A method as recited in claim 1, wherein the first data pattern is a  
12 watermark.

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14           8.   A computer-readable medium having computer-executable  
15 instructions that, when executed by a computer, performs the method as recited in  
16 claim 1.

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18           9.   A method for revealing a covert data pattern of discrete values from  
19 an encoded data pattern of discrete values in a digital signal, the method  
20 comprising:

21           receiving the encoded data pattern;

22           extracting a discrete value of the covert data pattern from one or more  
23 values of the encoded data pattern.  
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1           10. A method as recited in claim 9 further comprising detecting an  
2 original data pattern within the encoded data pattern of the digital signal.

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4           11. A method as recited in claim 9, wherein  
5 a pattern of discrete values may be encoded into the signal in one of  
6 multiple discrete states;  
7 the extracting comprises decoding a discrete value of the covert data pattern  
8 from the digital signal based upon a state of a one or more discrete values of the  
9 encoded data pattern.

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11           12. A method as recited in claim 9, wherein the digital signal is an  
12 digital audio signal.

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14           13. A computer-readable medium having computer-executable  
15 instructions that, when executed by a computer, performs the method as recited in  
16 claim 9.

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18           14. A method for encoding a watermark with a covert message into a  
19 digital audio signal, wherein binary bits of the watermark may be encoded into the  
20 signal in multiple states, the method comprising encoding one or more bits of the  
21 watermark into the digital signal into a state that indicates a discrete value of the  
22 covert message.

1           15. A method as recited in claim 14, wherein the multiple states are  
2 positive or negative modifications to magnitudes of one or more subbands in the  
3 frequency spectrum of a sample of the signal.

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5           16. A method for imposing a covert message into a watermark, the  
6 method comprising:

7           generating multiple watermarks;

8           assigning a watermark to each of possible discrete value for a portion of the  
9 covert message;

10          selecting a watermark that corresponds to an actual discrete value of a  
11 specific portion of the covert message;

12          encoding the selected watermark into the signal.

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14          17. A method as recited in claim 16, wherein  
15 size of all portions of the covert message is N bits long;

16          quantity of the multiple watermarks is  $2^N$ .

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18          18. A computer-readable medium having computer-executable  
19 instructions that, when executed by a computer, perform a method (for) for  
20 concealing data within a digital signal, the method comprising:

21          receiving a first data pattern of discrete values and a second data pattern of  
22 discrete values;

23          imposing a discrete value of the second data pattern over one or more  
24 values of the first data pattern.  
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2       **19.**   A computer-readable medium having computer-executable  
3 instructions that, when executed by a computer, perform a method for revealing a  
4 covert data pattern of discrete values from an encoded data pattern of discrete  
5 values in a digital signal, the method comprising:

6       receiving the encoded data pattern;

7       extracting a discrete value of the covert data pattern from one or more  
8 values of the encoded data pattern.

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10       **20.**   An apparatus comprising:

11       a processor;

12       a covert-channel-encoder executable on the processor to:

13           receive a first data pattern of discrete values and a second data  
14 pattern of discrete values;

15           impose a discrete value of the second data pattern over one or more  
16 values of the first data pattern;

17           encode result of such imposing into a digital signal.  
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1       **21.**     An apparatus comprising:

2       a processor;

3       a covert-channel-decoder executable on the processor to:

4             receive a encoded data pattern within a digital signal;

5             extract a discrete value of a covert data pattern from one or more  
6       values of the encoded data pattern.

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8       **22.**     A data encoding system for concealing data within a digital signal,  
9       the system comprising:

10            a receiver for receiving a first data pattern of discrete values and a second  
11       data pattern of discrete values;

12            an imposer coupled to such receiver, the imposer for imposing a discrete  
13       value of the second data pattern over one or more values of the first data pattern;

14            an encoder coupled to the receiver and the imposer, the encoder for  
15       inserting within the digital signal results of the imposer's imposing a discrete  
16       value of the second data pattern over one or more values of the first data pattern.

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18       **23.**     An operating system comprising an encoding system as recited in  
19       claim 22.  
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1 24. A marked signal with an encoded data channel therein, wherein such  
2 encoded data channel has a covert data channel imposed therein, the marked signal  
3 generated in accordance with the following acts:

4 receiving an original data pattern of discrete values and a covert data  
5 pattern of discrete values;

6 imposing a discrete value of the covert data pattern over one or more values  
7 of the original data pattern;

8 encoding results of the imposing within an unmarked signal to produce the  
9 marked signal.  
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11 25. A marked signal as recited in claim 24, wherein the imposing  
12 comprises performing a Boolean operation with a discrete value of the second data  
13 pattern and one or more values of the first data pattern.

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15 26. A marked signal as recited in claim 24, wherein the imposing  
16 comprises XORing a discrete value of the second data pattern with one or more  
17 values of the first data pattern.  
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1           27.    A marked signal as recited in claim 24, wherein  
2           a pattern of discrete values may be encoded into the signal in one of  
3 multiple discrete states;

4           the imposing comprises encoding one or more values of the first data  
5 pattern into the digital signal into a state that indicates a discrete value of the  
6 second data pattern.

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8           28.    A marked signal as recited in claim 24, wherein the digital signal is  
9 an digital audio signal.

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11          29.    A marked signal as recited in claim 24, wherein the original data  
12 pattern is a watermark.

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14          30.    A method for concealing data within a digital signal, the method  
15 comprising:

16           receiving a set of data having an original order;

17           permuting the set of data so that it is in a different order than the original;

18           encoding the permuted set of data into the digital signal.

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20          31.    A method as recited in claim 30, wherein the permuting utilizes a  
21 permutation table to determine the order in which to permute the set of data.  
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1           32.    A method as recited in claim 30, where in the set of data is a portion  
2 of a watermark.

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4           33.    A computer-readable medium having computer-executable  
5 instructions that, when executed by a computer, perform a method for concealing  
6 data within a digital signal, the method comprising:

7           receiving a set of data having an original order;

8           permuting the set of data so that it is in a different order than the original;

9           encoding the permuted set of data into the digital signal.

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11          34.    A modulated signal with an permuted data channel encoded therein,  
12 the signal generated in accordance with the following acts:

13           receiving a set of data having an original order;

14           permuting the set of data so that it is in a different order than the original;

15           encoding the permuted set of data into a digital signal to produce the  
16 modulated signal with an permuted data channel encoded therein.